MedicalXpress

Saliva eyed as alternative to blood for patient testing

June 4 2012, By Andrea K. Walker

No one likes to get stuck with a needle. But it's the only way doctors can get blood to test for diabetes, anemia and numerous other health problems.

Scientists at the Johns Hopkins University School of Nursing say there is a much less invasive and painless means of detecting illnesses in patients - spit.

Like blood, spit contains proteins, hormones, enzymes and DNA that can be used to test for and combat disease. It is easy and inexpensive to collect and analyze, making it ideal for research.

Scientists already are using saliva tests for research and believe we will one day soon see the market open to consumers who will be able to test for illnesses from their bedsides with a simple swab of the mouth. This could be especially beneficial in rural areas and other places with limited access to health care and for people who may not be able to get to a doctor's office.

Saliva research has been around for years, but spit's use in medical settings is still limited mostly to detecting HIV and hormone-related diseases. The field is now at a crossroads with better tools and methods to test saliva, some researchers say. They expect saliva testing to become more common in the near future.

Recent studies at Johns Hopkins have found saliva can be used to detect

cardiovascular disease risk and to collect DNA samples. One study even used it to show how women's relationships with their fathers indicate how well they deal with stress.

"We're discovering that by using spit we are able to measure more things than we were ever able to measure before and we know now how to design the tools to collect samples accurately and to do the measurements accurately," said Doug Granger, director of Hopkins' Center for Interdisciplinary Salivary Bioscience Research. "Now we want to take all that work and start to apply it in screening and diagnostics."

Granger began researching saliva nearly two decades ago as a graduate student studying biological reasons for problem behavior in children. He found many families didn't want to participate because it required numerous blood samples.

In 1998, he helped found the company Salimetrics to develop tools for saliva collection and testing. It took years to perfect the science.

Earlier research tried to test saliva in the same way as blood, when the two are very different. Blood is thick like syrup while saliva is water-like. The consistency of saliva changes by the moment and by the person. Blood stays pretty consistent. The analytes, or chemicals, in saliva are low so the acids to detect them need to be more sensitive.

"To optimize the tests so they worked well with saliva required some pretty significant changes," Granger said. "We had to figure out how to treat it, filter it and collect it so that when it went into the test those differences would be accounted for."

The Eunice Kennedy Shriver National Institute of Child Health and Human Development is conducting a pilot project with Hopkins to see if

saliva should be used in a national study on children's health issues. The institute's researchers are looking to see if spit tests are effective on participants of different ages. The federally mandated study will follow 100,000 children from birth to age 21.

"We like tests that are fast, that are inexpensive and can be repeated multiple times at many ages," said Dr. Steven Hirschfeld, the institute's associate director for clinical research.

The saliva center at Hopkins has conducted 45 research projects in 18 months using spit tests.

One study found the levels of the enzyme alpha amylase in children's saliva was associated with their performance in school. The enzyme is released from the salivary gland when the autonomic nervous system is activated. This can happen when a person is concentrating hard or doing cognitive work or experiencing an adrenaline rush.

Hopkins research also used saliva to detect early signs of cardiovascular disease risk, and prevent heart attacks in victims who never show warning signs, by testing c-reactive protein levels. There is now only a blood test for the protein. Low levels of the protein show a low risk for cardiovascular disease. Higher levels could mean a risk for cardiovascular disease.

Past research has shown that daughters who have good relationships with their fathers have better romantic relationships with men. More recent Hopkins research found that the reason can be found in saliva. A study found negative father-daughter relationships resulted in elevated levels of cortisol stress hormone levels in these girls when they discussed problems with friends.

Granger said there needs to be further research before spit can be used

in hospitals and doctors' offices and in at-home tests. The Hopkins spit center is working with other departments of the medical system on research and also holds spit boot camps to teach researchers around the country.

But Granger also noted that spit tests will never replace blood tests. Levels of certain enzymes, proteins or hormones in blood might not have the same correlation in spit. Other times doctors need to test a full panel of different components found in blood, which can't be done with spit.

"People want to measure things in saliva because they want to use it for a surrogate marker for what's in your blood," Granger said. "That is not always the case."

Stephen Schenkel, chairman of the emergency department at Mercy Medical Center, said spit tests aren't used much because of their limitations, but he noted a general movement for less invasive medicine. Doctors are taking smaller vials of blood in children and a drop of blood now can be used to test blood sugar.

He said new spit testing should be cost-effective.

"For the most part blood is not that hard to get and most blood testing is fairly inexpensive," Schenkel said. "If they're doing it just because people are squeamish, that is not a good reason to do it."